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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/655,939	09/05/2003	Naoya Hasegawa	9281-4639	7010

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EXAMINER

BERNATZ, KEVIN M

ART UNIT	PAPER NUMBER
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1773

DATE MAILED: 03/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

4D

<b>Office Action Summary</b>	<b>Application No.</b> 10/655,939	<b>Applicant(s)</b> HASEGAWA ET AL.	
	<b>Examiner</b> Kevin M Bernatz	<b>Art Unit</b> 1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 11-14 is/are rejected.
- 7) ☒ Claim(s) 9 and 10 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>9/5/03</u> . | 6) <input type="checkbox"/> Other: ____  |

## **DETAILED ACTION**

### ***Response to Amendment***

1. Preliminary amendments to the specification and claims 1, 2, 5, 6, 8 and 10 - 13, filed on September 5, 2003, have been entered in the above-identified application.

### ***Claim Objections***

2. Claim 1 is objected to because of the following informalities: "first ferromagnetic layer" in the last line of the claim should be *first ferromagnetic layers*. Appropriate correction is required.

3. Claims 9 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3 recites the limitation "jutting portions of the first antiferromagnetic layers" in lines 3 - 4. There is insufficient antecedent basis for this limitation in the claim. The

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Examiner notes that it appears that the intended language should have been *jutting portions of the first ferromagnetic layers*, which is how the Examiner is interpreting the claim for the purpose of evaluating the prior art.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1, 2, 4, 8, 13 and 14 are rejected under 35 U.S.C. 102(a) and/or (e) as being anticipated by Shimazawa et al. (U.S. Patent App. No. 2003/0218836 A1).

Regarding claim 1, Shimazawa et al. disclose a magnetic detecting element comprising a multilayer laminate including a first antiferromagnetic (AFM) layer (*Figure 2, element 21*), a pinned magnetic layer (*element 23*), a nonmagnetic material layer (*element 25*), and a free magnetic layer (*element 27*) deposited in that order from below; a nonmagnetic interlayer (*element 31*) deposited on the free magnetic layer, a pair of first ferromagnetic (FM) layers (*elements 33*) on the nonmagnetic interlayer in end portions in a track width direction of the magnetic detecting element, the first FM layers being separated in the track width direction by a space therebetween; a pair of

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second AFM layers (*elements 35*) separately deposited on the respective first FM layers; a pair of second FM layers (*elements 37*) separately deposited on the respective second AFM layers, and electrode layers (*Figure 1, elements 3 and 15*), wherein the magnetization direction of the second FM layers is antiparallel to that of the first FM layers (*Paragraph 0067*).

Regarding claims 2, 4, 13 and 14, Shimazawa et al. disclose "jutting" meeting applicants' claimed limitations (*Figures 1 and 2*).

Regarding claim 8, Shimazawa et al. disclose nonmagnetic layers (*Figure 3, elements 41*) between the respective second AFM layers (*elements 35*) and the second FM layers (*elements 43*), and third AFM layers (*elements 45*) on the respective upper surfaces of the second FM layers, wherein the second FM layers comprise a soft magnetic material (*Paragraph 0075*).

8. Claims 1, 5 and 6 are rejected under 35 U.S.C. 102(a) and/or (e) as being anticipated by Gill (U.S. Patent App. No. 2003/0156362 A1).

Regarding claim 1, Gill discloses a magnetic detecting element comprising a multilayer laminate including a first antiferromagnetic (AFM) layer (*Figure 5, element 100*), a pinned magnetic layer (*element 102*), a nonmagnetic material layer (*element 110*), and a free magnetic layer (*element 60*) deposited in that order from below; a nonmagnetic interlayer (*Figure 4, element 80*) deposited on the free magnetic layer, a pair of first ferromagnetic (FM) layers (*element 82*) on the nonmagnetic interlayer in end portions in a track width direction of the magnetic detecting element (*Figure 3, which is*

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*an alternative construction to the free layer biasing structure shown in Figure 4), the first FM layers being separated in the track width direction by a space therebetween (Figures 2 and 3, element 68); a pair of second AFM layers (element 62) separately deposited on the respective first FM layers; a pair of second FM layers (element 64) separately deposited on the respective second AFM layers, and electrode layers (Figure 3, elements 76).*

Regarding the limitation “a magnetization direction of the second ferromagnetic layers is antiparallel to that of the first ferromagnetic layers”, it has been held that where claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established and the burden of proof is shifted to applicant to show that prior art products do not necessarily or inherently possess characteristics of claimed products where the rejection is based on inherency under 35 USC 102 or on *prima facie* obviousness under 35 USC 103, jointly or alternatively. Therefore, the *prime facie* case can be rebutted by **evidence** showing that the prior art products do not necessarily possess the characteristics of the claimed product. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). “When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not.” *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

In the instant case, the disclosed and prior art products are substantially identical in structure and materials and are used for identical purposes.

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Therefore, in addition to the above disclosed limitations, the presently claimed property of "a magnetization direction of the second ferromagnetic layers is antiparallel to that of the first ferromagnetic layers" would have inherently been present because the disclosed and prior art products are substantially identical in structure, materials and intended use.

Regarding claim 5, Gill disclose soft magnetic materials directly deposited on the upper surface of the second AFM layer (*Figure 4 and Paragraphs 0027 and 0034*).

Regarding claim 6, the Examiner deems that the disclosed embodiment in Gill would inherently meet the claimed limitation of the relative magnetic moment per unit area (*Paragraphs 0034 and 0038 – first magnetic layer of 30 Å CoFe versus composite free magnetic layer of 15 Å CoFe and 15 Å NiFe*).

### ***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 2, 3, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gill as applied above, and further in view of Shimazawa et al. ('836 A1).

Gill is relied upon as described above.

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Regarding claims 2, 3, 13 and 14, Gill fails to disclose the claimed structural elements.

However, Shimazawa et al. teach that the claimed structural elements are functional equivalents to the Gill magnetic detecting device structure (*Figures 1 – 3*). Substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. In the instant case, since the disclosed structures are both recognized as functioning magnetic detecting devices, the Examiner deems that both structures are functional equivalents in the field of magnetic detecting devices. *In re Fount* 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Gill to use the claimed structure as taught by Shimazawa et al., since the use of functionally equivalent structures is within the knowledge of one of ordinary skill in the art.

11. Claims 7, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimazawa et al. as applied above, and further in view of Lin et al. (U.S. Patent App. No. 2004/0042130 A1).

Regarding claim 7, Shimazawa et al. further disclose second FM layers comprising a hard magnetic material (*Paragraphs 0051 and 0067 – the Examiner notes that while Paragraph 0067 refers to the CoCr alloys as “antiferromagnetic” materials,*



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*one of ordinary skill in the art would readily appreciate that this is either a typographical error or a gross mischaracterization of these alloys, as evidenced by Paragraph 0051).*

Shimazawa et al. fail to disclose a nonmagnetic layer between the respective second AFM layers and the second FM layers.

However, Lin et al. teach that using nonmagnetic layers between an AFM material layer and a hard magnetic Co-alloy biasing layer results in improved crystal growth of the hard magnetic alloy, and hence improved coercivity which results in superior exchange coupling (*Paragraphs 0033 and 0037 – 0039*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Shimazawa et al. to use a nonmagnetic layer meeting applicants' claimed structural limitations as taught by Lin et al. in order to insure that the hard magnetic layer possesses an improved coercivity which results in superior exchange coupling.

Regarding claims 11 and 12, the magnetic moment per unit area is directly related to the exchange coupling force produced between the biasing first FM layers and the free layer. The Examiner deems that it would have been obvious to one having ordinary skill in the art to have determined the optimum value of a results effective variable such as the relative magnetic moments per unit area of the free layer and the first FM layers for biasing of the end regions of the free magnetic layer through routine experimentation, especially given the knowledge in the art that one desires the end regions of the free layer to be biased, but for the region within the track width to be free to respond to the external magnetic force. *In re Boesch*, 205 USPQ 215 (CCPA 1980);

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*In re Geisler*, 116 F. 3d 1465, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997); *In re Aller*, 220 F.2d, 454, 456, 105 USPQ 233, 235 (CCPA 1955).

### ***Allowable Subject Matter***

12. The following is a statement of reasons for the indication of allowable subject matter: claims 9 and 10 require specific choices of the first, second and third antiferromagnetic materials which are not disclosed or rendered obvious by the prior art of record. Specifically, Shimazawa et al. teach away from the requirement to form all three AFM layer from the same material (*Paragraphs 0077 – 0081*) or the requirement to control the blocking (i.e. "Néel") temperatures in the claimed order (*ibid*).

### ***Conclusion***

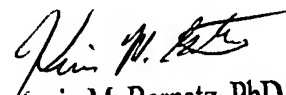
13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (571) 272-1505. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carol Chaney can be reached on (571) 272-1284. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KMB  
March 3, 2005

  
Kevin M. Bernatz, PhD  
Primary Examiner